

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 43

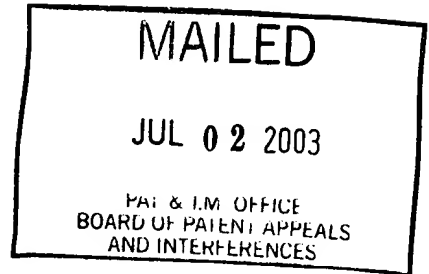
UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte HAE-SEUNG LEE

Appeal No. 2003-0573
Application No. 08/931,125

HEARD: JUNE 12, 2003



Before RUGGIERO, GROSS, and BLANKENSHIP, Administrative Patent Judges.

RUGGIERO, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on the appeal from the final rejection of claims 1-8, which are all of the claims pending in the present application.

The claimed invention relates to a redundant array of inexpensive disks (RAID) system which includes a plurality of defect-adaptive memory devices having a first region for storing

parity information for data recovery and a second region for storing data. More particularly, each of a plurality of caches are coupled to a corresponding unique one of the defect-adaptive memory devices for storing parity information for data recovery.

Claim 1 is illustrative of the invention and reads as follows:

1. A redundant array of inexpensive disks (RAID) level 5 memory system, comprising:

a plurality of defect-adaptive memory devices, each of said plurality of defect-adaptive memory devices having a first region for sequentially storing parity information for data recovery and a second region for storing data;

a plurality of caches, each of said plurality of caches respectively coupled operatively to a corresponding single unique one of said plurality of defect-adaptive memory devices, each of said plurality of caches adapted for storing parity information for data recovery for a corresponding single unique one of said plurality of defect-adaptive memory devices to provide one-to-one caching; and

a controller operatively coupled to each defect-adaptive memory device of said plurality of defect-adaptive memory devices and to each corresponding single unique cache of said plurality of caches, said controller comprising a first means for selectively controlling writing and reading of parity information needed for data recovery in said first region of each corresponding single unique one of said plurality of defect-adaptive memory devices, a second means for selectively obtaining parity information needed for data recovery from said first region of each corresponding single unique one of said plurality of defect-adaptive memory devices, and a third means for selectively storing parity information needed for data

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recovery obtained from said first region of a corresponding single unique one of said plurality of defect-adaptive memory devices in a predetermined corresponding single unique one of said plurality of caches.

The Examiner relies on the following prior art:

Holland et al. (Holland)	5,455,934	Oct. 03, 1995
Jones	5,572,660	Nov. 05, 1996
		(filed Nov. 13, 1995)

Claims 1, 2, and 6-8 stand finally rejected under 35 U.S.C. § 102(e) as being anticipated by Jones. Claims 3-5 stand finally rejected under 35 U.S.C. § 103(a) as being unpatentable over Jones in view of Holland.

Rather than reiterate the arguments of Appellant and the Examiner, reference is made to the Briefs¹ and Answer for the respective details.

OPINION

We have carefully considered the subject matter on appeal, the rejections advanced by the Examiner, and the evidence of anticipation and obviousness relied upon by the Examiner as support for the rejections. We have, likewise, reviewed and taken into consideration, in reaching our decision, Appellant's

¹ The Appeal Brief was filed August 28, 2002 (Paper No. 35). In response to the Examiner's Answer dated November 4, 2002 (Paper No. 36), a Reply Brief was filed December 18, 2002 (Paper No. 38), which was acknowledged and entered by the Examiner as indicated in the communication dated January 8, 2003 (Paper No. 39).

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arguments set forth in the Briefs along with the Examiner's rationale in support of the rejections and arguments in rebuttal set forth in the Examiner's Answer.

It is our view, after consideration of the record before us, that the disclosure of Jones fully meets the invention as recited in claims 1, 2, and 6-8. We are also of the opinion that the evidence relied upon and the level of skill in the particular art would not have suggested to one of ordinary skill in the art the obviousness of the invention set forth in claims 3-5. Accordingly, we affirm-in-part.

Appellant's arguments in response to the Examiner's rejections of the appealed claims are organized according to a suggested grouping of claims indicated at page 8 of the Brief. We will consider the appealed claims separately only to the extent separate arguments for patentability are presented. Any dependent claim not separately argued will stand or fall with its base claim. Note In re King, 801 F.2d 1324, 1325, 231 USPQ 136, 137 (Fed. Cir. 1986); In re Sernaker, 702 F.2d 989, 991, 217 USPQ 1, 3 (Fed. Cir. 1983).

We consider first the Examiner's 35 U.S.C. § 102(e) rejection of claims 1, 2, and 6-8 based on Jones. Initially, we note that anticipation is established only when a single prior

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art reference discloses, expressly or under the principles of inherency, each and every element of a claimed invention as well as disclosing structure which is capable of performing the recited functional limitations. RCA Corp. v. Applied Digital Data Sys., Inc., 730 F.2d 1440, 1444, 221 USPQ 385, 388 (Fed. Cir.); cert. dismissed, 468 U.S. 1228 (1984); W.L. Gore & Assocs. v. Garlock, Inc., 721 F.2d 1540, 1554, 220 USPQ 303, 313 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984).

With respect to independent claim 1, the representative claim for Appellant's first suggested grouping (including claims 1, 2, and 6) subject to the 35 U.S.C. § 102(e) rejection, the Examiner indicates (Answer, pages 3 and 4) how the various limitations are read on the disclosure of Jones. In particular, the Examiner directs attention to the illustration in Figure 2D of Jones along with the accompanying description at column 10, lines 7-26.

After reviewing the Examiner's analysis, it is our opinion that the stated position is sufficiently reasonable that we find that the Examiner has at least satisfied the burden of presenting a prima facie case of anticipation. The burden is, therefore, upon Appellant to come forward with evidence and/or arguments which persuasively rebut the Examiner's prima facie case. Only

those arguments actually made by Appellant have been considered in this decision. Arguments which Appellant could have made but chose not to make in the Briefs have not been considered (see 37 CFR § 1.192(a)).

In response, Appellant's arguments (Brief, pages 9-11; Reply Brief, pages 2-4) focus on the Examiner's alleged misinterpretation of the Jones reference which, in Appellant's view, has no disclosure of a one-to-one caching arrangement in a RAID-5 disk system. According to Appellant, the portion of Jones which describes the RAID-5 embodiment illustrated in Figure 2D, i.e., column 10, lines 7-26, is silent about any one-to-one caching arrangement. Further, Appellant contends that the Figure 2D illustration in Jones contains nothing which excludes a one-to-many connection and draws attention to the presence of an ellipsis between the caches and disks drives, asserting that one can only speculate as to what is actually contained there.

After careful review of the Jones reference in light of the arguments of record, however, we are in agreement with the Examiner's position as stated in the Answer. Our interpretation of the disclosure of Jones coincides with that of the Examiner, i.e., while Jones' Abstract, which describes a dedicated cache arrangement, is directed to a RAID-4 system, Jones also describes

a RAID-5 system (column 10, lines 7-26). As pointed out by the Examiner (Answer, page 7), Jones describes the RAID-5 embodiment, illustrated in Figure 2D, as being similar to the RAID-4 system illustrated in Figure 2 with the exception that parity data is distributed throughout the disk drives in accordance with RAID-5 system requirements. In our view, even though Jones does not use the terminology "one-to-one caching," one of ordinary skill, when viewing Jones' Figure 2D illustration coupled with the explicit description of dedicated caching elsewhere in Jones, would recognize and appreciate that one-to-one caching is being implemented. We further agree with the Examiner that, contrary to Appellant's assertions, the skilled artisan, given the entirety of the disclosure of Jones, would reasonably interpret the ellipses in Jones' Figure 2D as signifying a continuation of the existing structure as shown, i.e., arrangements of one cache connected to a unique disk in a continuing string. In considering the disclosure of a reference, it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonably be expected to draw therefrom. In re Preda, 401 F.2d 825, 826,

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159 USPQ 342, 344 (CCPA 1968). Accordingly, the Examiner's 35 U.S.C. § 102(e) rejection of representative claim 1, as well as claims 2 and 6 which fall with claim 1, is sustained.

Turning to a consideration of the Examiner's 35 U.S.C. § 102(e) rejection of claims 7 and 8 based on Jones, we sustain this rejection as well. With respect to independent claim 7, the representative claim for Appellant's suggested grouping of claims 7 and 8, Appellant asserts that the claim is in a "step-plus-function" format and the Examiner has not applied the proper legal test for evaluating such claims under the sixth paragraph of 35 U.S.C. § 112. As further asserted by Appellant (Brief, pages 13 and 14; Reply Brief, pages 4 and 5), an assertion with which we would agree, in order to properly interpret a step-plus-function claim the Examiner's burden of establishing a prima facie case involves at least two requirements. Initially, the Examiner must provide evidence that the structure identified in a prior art reference actually performs the function set forth in the claims. Further, the Examiner is required to show whether the identified prior art structure which performs such a function is equivalent to the structure disclosed in Appellant's specification. See In re Donaldson, 16 F.3d 1189, 1193, 29 USPQ2d 1845, 1848-49 (Fed. Cir. 1994).

Our review of the Examiner's analysis of claim 7 reveals, contrary to Appellant's contention, that the Examiner has in fact applied the proper legal standard required by the sixth paragraph of 35 U.S.C. § 112. The functional language that exists in claim 7 appears in the concluding "improvement comprising" clause and reads " . . . a step for reducing overhead during a read operation for data recovery and thereby improving data input-output performance." We agree with the Examiner that the dedicated cache structure of Jones performs Appellant's claimed function of reducing overhead during read operations by accessing data present in the cache without having to read and write the disk drives.

Further, we find no error in the Examiner's analysis that concludes that the dedicated caching structure provided by Jones is equivalent to Appellant's disclosed one-to-one cache and disk arrangement for all of the reasons we previously discussed in regard to the anticipation rejection of representative claim 1. We further find, as did the Examiner, that, contrary to Appellant's arguments (Reply Brief, page 5), the operational cache reading and writing and parity updating steps performed by Jones as illustrated in the flow charts of Figures 3A-3E are the

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equivalent of the operational steps described at page 11 of Appellant's specification and illustrated in Appellant's Figure 5.

We next turn to a consideration of the Examiner's 35 U.S.C. § 103(a) rejection of claims 3-5 as being unpatentable over Jones in view of Holland. The Examiner, as the basis for the obviousness rejection, proposes to modify the RAID disk system disclosure of Jones. According to the Examiner (Answer, page 6), Jones discloses the claimed invention except that the parity information needed for data recovery is not disclosed as being sequentially arranged from the most outer cylinder on a recording medium. To address this deficiency, the Examiner turns to the Holland reference which, as asserted by the Examiner, teaches that data stored in the outermost disk cylinders has higher sustained data transfer rates (Holland, column 9, lines 25-30). In the Examiner's analysis (id.), the skilled artisan, in view of Holland, would have been motivated and found it obvious " . . . to sequentially arrange the recovery information from the most outer cylinder in Jones, because this method reduces seek time, and results in higher sustained data rates for the data most limiting the performance, and therefore most efficiently improves the performance."

Appellant's arguments in response to the obviousness rejection of claims 3-5 assert (Brief, pages 15-18: Reply Brief, pages 6 and 7) that the Examiner has failed to establish a prima facie case of obviousness since proper motivation for the Examiner's proposed combination of references has not been established. After careful review of the applied Jones and Holland references in light of the arguments of record, we find ourselves in general agreement with Appellant's position as stated in the Briefs. While the portion of the Holland disclosure referenced by the Examiner does teach that higher sustained data transfer rates are obtained on the outer tracks of a drive, it is our view, however, that the teaching value of this passage from Holland can only be evaluated by reading it in the context of the entirety of the disclosure of Holland. The Holland reference is directed to the partitioning of physical drives into logical ranks in which plural logical RAID schemes can be combined on a single physical drive. For example, Holland suggests (column 1, lines 50-55) that a RAID-3 system, which has a separate parity drive, is more suited to handling large blocks of data while a RAID-5 system, in which parity data is distributed throughout the drives, is more applicable for random small blocks of data. In the example discussed in the portion of

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Holland cited by the Examiner, RAID-3 and RAID-5 logical ranks are combined in one physical drive with the RAID-3 logical ranks stored on the outer tracks of the physical drive. It seems apparent that this arrangement would follow since, as suggested by Holland, a RAID-3 system is more suitable for handling large data blocks and therefore can take advantage of the higher data transfer rates on the outer disk cylinder.

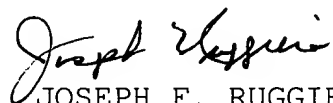
With this background in mind, however, we fail to see how the skilled artisan, from Holland's disclosure of storing a RAID-3 logical scheme on disk outer cylinders, would have found it obvious to modify Jones to arrive at the claimed invention. In our opinion, in order to do so, it would require one to counterintuitively strip away the parity data, which in RAID-5 systems is conventionally distributed throughout the disks, and store only such parity data in the outermost cylinders of a disk as claimed. In our view, any such teaching or suggestion could only come from Appellant's own disclosure, and not from any teaching in the Jones or Holland references themselves. Accordingly, since all of the claimed limitations are not taught or suggested by the applied prior art references, the Examiner's 35 U.S.C. § 103(a) rejection of claims 3-5 is not sustained.

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In summary, we have sustained the Examiner's 35 U.S.C. § 102(e) rejection of claims 1, 2 and 6-8, but have not sustained the 35 U.S.C. § 103(a) rejection of claims 3-5. Therefore, the Examiner's decision rejecting claims 1-8 is affirmed-in-part.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED-IN-PART



JOSEPH F. RUGGIERO)
Administrative Patent Judge)



ANITA PELLMAN GROSS)
Administrative Patent Judge)

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